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BOTANY OF MT. SARAMATI AND ITS ENVIRONS

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ABSTRACT

The paper gives a brief account of botany of Mt. Saramati in Nagaland, India which represents the state's highest mountain peak (3841m), the remotest and the botanically unexplored area. A brief note on topography, geology, climate and vegetation together with a comprehensive analysis of the floristic compositions of the vegetation types and is followed by enumeration of the species of angiosperms and gymnosperms. Analysis of the species collected established the following five families as the richest ones on the basis of the number of the species. Orchidaceae (25), Poaceae (24), Asteraceae (17), Ericaceae (13), Cyperaceae (9). These together represent about 40% of the total number of species collected.

All the species recorded in this paper, except *Deyeuxia pulchella* (Griseb.) Hook. f. (Poaceae) are new additions to the Kanjilal's Herbarium (ASSAM) from the area. There is also no record of any representation of plant species from there by Clarke (1886, 1889), Hooker (1872-97), Kanjilal *et al.* (1934-40), Bor (1942), Jamir and Rao (1988). The present paper, therefore, represents the first source of information regarding botany of the Mt. Saramati.

INTRODUCTION

Mt. Saramati lies approximately between 26°2' - 26°7' N and 97°6' - 97°13' E with an area of *ca* 200 Km² and varies in altitude from about 2000 m to 3841 m, on the Barail range in the Tuensang district of Nagaland. From Pungro, the circle headquarter of the district it takes two days trekking to reach the peak. A part of the Saramati falls within Burma.

A floristic study of this region has not been made so far by earlier workers, owing mainly to the lack of road communication, infestation of the forests with wild animals and therefore, being considered inaccessible and risky for purposes of botanical explorations up-to-date.

Of *ca* 45,000 specimens from Assam Forest Herbarium including collection from different parts of Nagaland transferred to the Eastern Circle, Botanical Survey of India, Shillong in April, 1956 and maintained as Kanjilal's Herbarium (ASSAM) on critical studies revealed only a lone specimen of Poaceae member, *viz.* *Deyeuxia pulchella* (Griseb.) Hook. f. from the Mt. Saramati. Furthermore, a survey of literature on early history of botanical collections in the state by Clarke (1886, 1889), Hooker (1872-97), Kanjilal *et al.* (1934-40), Bor (1942) and even in the recent years by Jamir and Rao (1988) has shown no record of any representation of plant species from the area. Jamir and Rao (1988) remark "Tuensang and Mon are not easily accessible at present ......" Hence it is appropriate to record the present available observations on this botanically rich and unexplored area, made during two seasonal exploration trips in October-November and April-May, 1991 which yielded a total of 212 species distributed over 157 genera and 64 families.

This paper presents a brief note on topography, geology, climate and vegetation together with a comprehensive analysis of the floristic compositions of the vegetation types and is followed by enumeration of the species of angiosperms and gymnosperms in the Appendix alongwith their distribution data in the selected floras of surrounding areas. Plants are arranged according to Bentham and Hooker's classification; the genera and species within a family are arranged in alphabetical order. Every attempt has been made to bring the nomenclature up to date. Descriptions have been deliberately avoided as they are available in several published floras. All the collections have been preserved in the Kanjilal's Herbarium of the Eastern Circle, Botanical Survey of India (ASSAM).

CLIMATE

During summer, the average annual rainfall is between 200-250 cm and the bulk of precipitation is received through south-west monsoon. The temperature varies between 10°C-20°C. While in winter, the climate is generally dry with low precipitation. The temperature varies between 10°C to minus 5°C and large tract of snow occurs over higher elevations.

TOPOGRAPHY AND GEOLOGY

Mt. Saramati lies on the Barail range which flanks the boundary with Burma. The access to the peak is comparatively difficult. The area is entirely hilly and the terrain is one of the most rugged with successive hills of varying heights. Geologically, the area is located in the northern extension of the Arakan Yuma ranges which are of tertiary-cretaceous age and belong to a fairly yong, mobile belt of the earth. The rock sequence is of geosynclinal facies, represented by the Barail group (Upper Eocene and Oligocene), which is essentially arenaceous, is 4,000 to 6,000 m thick and the lowest bed, the Nagaon formation are mostly well bedded sandstones and shales with several coal seams.

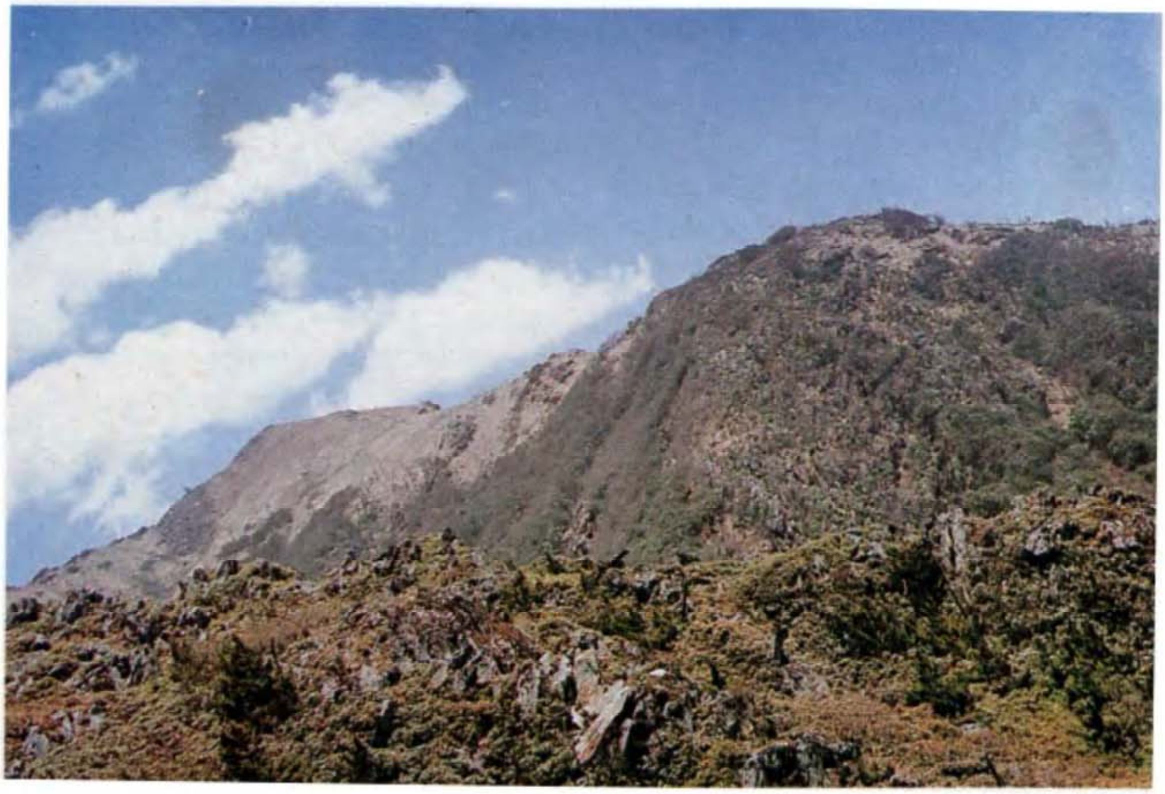
VEGETATION

The area, situated in the border of India and Burma supports an altitudinally distributed vegetation dense in growth and diverse in its rich species content. Its geographical location, climate and topography have all contributed to the characteristic vegetation and flora of the area. Due to relative noninterference by tribals there are still many virgin forest patches throughout the mountain. Broadly based on the floristic composition, the following vegetational types can be indicated :

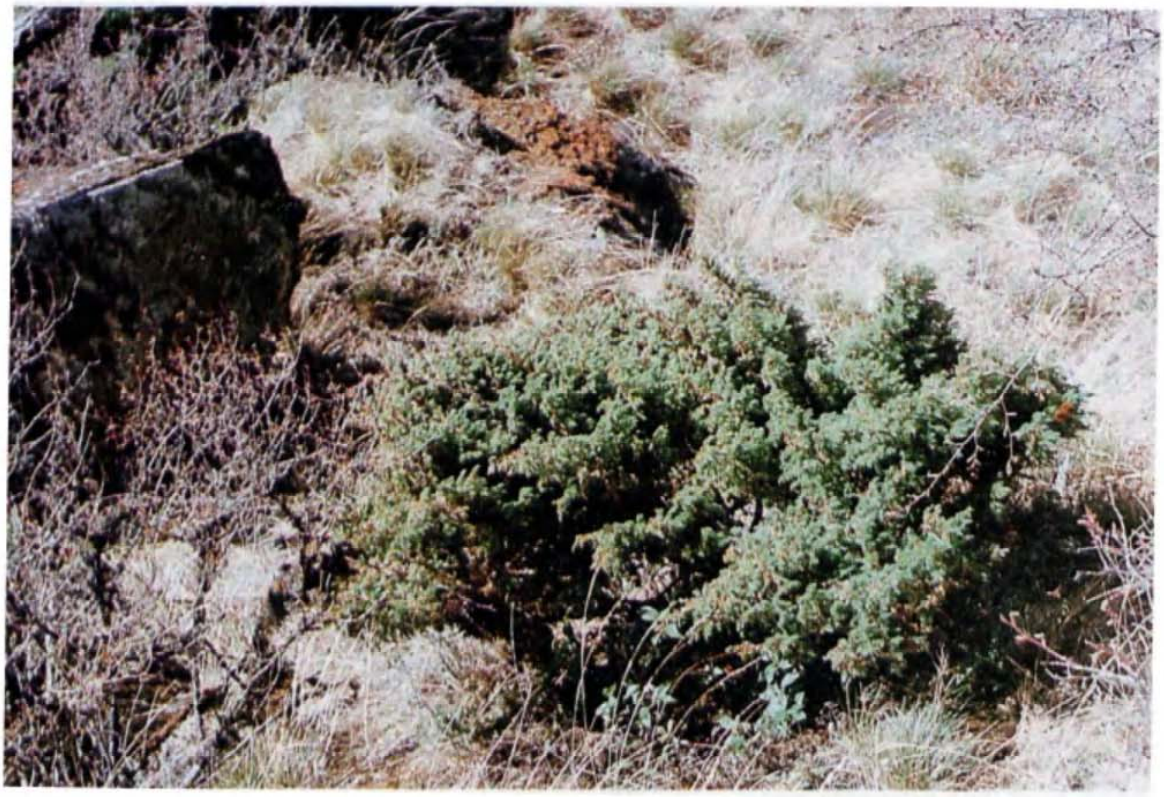
(i) *Subtropical pine forests* :— *Pinus kesiya* Royle ex Gordon is the principal element, which occurs almost in pure strands on way to the peak eastward from Pungro, the circle headquarter of the Tuensang district upto *ca* 2000m. Occasionally broad-leaved species such as *Lithocarpus dealbata* (Miq.) Rehder, *Schima wallichii* (A.DC.) Korth., are also noticed interspersed amongst these pines. The forest floor supports very little of herbaceous vegetation, chief amongst which is *Eupatorium adenophorum* Spr., which forms the dominant herbaceous vegetation.

(ii) *Temperate forests* : — These are confined upto *ca* 3,500 m. The lower storey is composed of several evergreen species such as *Alnus nepalensis* D. Don, *Bischofia javanica* Bl., *Engelhardtia spicata* Bl., *Magnolia campbelli* Hook. f. et Th. and *Quercus*, *Rhododendron* spp., etc. The top canopy is constituted by several commercially important species such as *Betula alnoides* Buch.-Ham., *Exbucklandia populnea* (Griff.) R. W. Brown, *Castanopsis indica* A.DC., *Juglans regia* L., *Michelia champaca* L., *Phoebe cooperiana* Kanjilal et Das, etc.; heavily moss-claded and offer a suitable habitat for luxuriant growth of orchids and other epiphytes. The forest floor supports the luxuriant growth of herbaceous vegetation. Of the outstanding component species, mention can be made of those belonging to *Impatiens, Panax, Anaphalis, Primula, Hetaeria, Zeuzine, Carex, Cyperus, Brachypodium, Deyeuxia* and *Arundinaria.*

(iii) *Sub-alpine meadows* : — These are confined at an altitude ranging between 3500-3841 m in the area and lack tree species. Shruby plants like *Juniperus recurva* Buch.-Ham. and *Rhododendron lepidotum* Wall. ex G. Don. The main herbaceous components, to mention a few,



Mt Saramati (3841 m) with sub-alpine vegetation.



Juniperus recurva Buch.-Ham. - a rare sub-alpine shrub.

Panax pseudo ginseng Wall. - a rare medicinal herb
in the temperate zone

of the area are : *Campanula aristata* Wall. ex Roxb., *Carex cruciata* Wahlenb., *Impatiens racemosa* A. DC., *Hypericum monanthenum* Hook. f. et Th., *Deyeuxia pulchella* (Griseb.) Hook. f. and *Cassiope fastigiata* (Wall.) D. Don.

THE CONSERVATION ASPECT

Mt. Saramati provides a good habitat for conservation of flora and serves a better site for the purpose of proposal as a Biosphere reserve, particularly so as there are many virgin forests still intact, with several rare, endangered and threatened plants occur here, to mention a few of the forests, are : *Aconitum lycoctonum* L. and *Panax pseudo-gingseng* Wall., of great medicinal value; *Cymbidium macrorhizon* Lindl., the only terrestrial leafless Indian Cymbidium; *C. tigrinum* Par. et Reichb. f., which occurs only in Nagaland in India and *Panisea apiculata* Lindl., a new record for the country, etc. besides the lower groups of plants, especially Lichens, such as *Usnea* and *Parmelia* spp., which are favoured by the musk deer during scarcity. It is also a home of several other protected species of the wildlife in India, such as the clouded leopard, golden cat, lion-tailed macacau; the peacock, great himalayan barbet and blythe's tragopan.

Plants reported from Mt. Saramati and the adjacent aras : Following table lists 212 species of angiosperms and gymnosperms hitherto recorded from the Mt. Saramati (2000-3841m) and it might be possible to get some impression of endemism and the affinities of surrounding mountain floras, to mention a few, are : the Nanda Devi National Park (3500 - 7800 m) and the 'Valley of Flowers' in the Mt. Kamet (3500 - 3733 m). On the basis of an analysis of the collections made reveals 34 and 96 species reported by Hajra (1983) and Wadhwa *et al.* (1987), respectively, have their extended distribution up to the Mt. Saramati.

Botanical name	Family	Mt. Nanda Devi	Mt. Kamet
Aconitum lycoctonum L.	Ranunculaceae		
Anemone rivularis Buch.-Ham	,,		×
Clematis buchaniana DC.	,,		×
C. montana Buch. -Ham. ex DC.	,,		×
Thalictrum foliolosum DC.	,,		
Magnolia campbelli Hk. f. et Th.	Magnoliaceae		
Mahonia pycnophylla (Fedde) Takeda	Berberidaceae		
Viola pilosa Bl.	Violaceae		×
V. sikkimensis Beck.	,,		
Cucubalus baccifer L.	Caryophyllaceae		×
Hypericum eleodoides Choisy	Hypericaceae		×
H. hookerianum Wt. et Am.	,,		×
H. monanthemum Hk. f. et Th.	,,		×
H. oblongifolium Choisy	,,		×
Schima wallichii (DC.) Korth.	Ternstroemiaceae		
Geranium nepalense Sweet	Geraniaceae		×
Impatiens arguta Hk. f.	Balsaminaceae		

Table contd.

Botanical name	Family	Mt. Nanda Devi	Mt. Kamet
Impatiens bracteolata Hk. f.	Balsaminaceae		
I. drepanophora Hk. f.	,,		
I. hypoleuca Hk. f.	,,		
I. latiflora Hk. f. et Th.	,,		
I. porrecta Hk. f. et Th.	,,		
I. racemosa DC.	,,		×
I. radiata Hk. f. et Th.			
Skimmia laureola Sieb. et Zucc. ex Walp.	Rutaceae		×
Toona ciliata Roem.	Meliaceae		×
Tetrastigma rumispermum (Laws) Planch	Vitaceae		
Acer campbelli Hk. f. et Th. ex Hiern.	Arecaceae		
Meliosma simplicifolia (Roxb.) Walp.	Sabiaceae		×
Sabia purpurea Hk. f. et Th.	,,		
Desmodium floribundum (D. Don) G. Don	Papilionaceae		×
D. triflorum (L.) DC.	,,		
Moghania vestita (Benth. ex Baker) Kuntz.	,,		×
Parochetus communis Buch.-Ham. ex D. Don	,,		×
Pueraria peduncularis (Benth.) Grah. ex Benth.	,,		×
P. thunbergiana (Sieb. et Zucc.) Benth.	,,		
Agrimonia pilosa Ledeb. var. *nepalensis* (D. Don) Nakai	Rosaceae		×
Duchesnea indica (Andr.) Focke	,,		×
Potentilla sundaica (Bl.) Kuntz.	,,		
Prunus cerasiodes D. Don	,,		×
Rosa sericea Lindl.	,,		×
Rubus calophyllus Cl.	,,		
R. ellipticus Sm.	,,		×
R. niveus Thunb.	,,		
Astilbe rivularis Buch.-Ham.	Saxifragaceae	×	×
Sedum multicaule Wall. ex Lindl.	Crassulaceae	×	×
Exbucklandia populnea (Griff.) R. W. Br.	Hamamelidaceae		
Circaea alpina L.	Onagraceae	×	×
Epilobium roseum (Schreb.) Pers.	,,	×	×
Begonia barbata Wall. ex DC.	Begoniaceae		
B. griffithii Hk. f.	,,		
B.. ovatifolia DC.	,,		
B. sikkimensis DC.	,,		

Table contd.

Botanical name	Family	Mt. Nanda Devi	Mt. Kamet
Chaerophyllum reflexum Lindl.	Apiaceae	×	
Oenanthe linearis Wall.	,,		
Pimpinella diversifolia DC.	,,		×
Hedera nepalensis Koch.	Araliaceae	×	
Panax pseudo-gingseng Wall.	,,		
Swida macrophylla (Wall.) Soiak	Cornaceae	×	
Viburnum cotinifolium D. Don	Caprifoliaceae	×	×
Leptodermis griffithii Hk. f.	Rubiaceae		–
Valeriana hardwickii Wall.	Valerianaceae	×	–
Adenostemma lavenia (L.) Kuntz.	Asteraceae		
Ainslea aptera DC.	,,	–	×
Anaphalis adnata Wall. ex DC.	,,		×
A. contorta (D. Don) Hk. f.	,,	×	×
A. triplinervis Cl.	,,		
Artemisia nilagirica (Cl.) Pamp.	,,		×
A. parviflora Roxb.	,,		
Bidens pilosa L.	,,		×
Cremanthodium reniforme Benth.	,,		×
Crepis japonica Benth.	,,		
Eupatorium adenophorum Spr.	,,	–	
Galingsoga parviflora Cav.	,,		
Gnaphalium affine D. Don	,,	–	×
Gynura cusimbua (D. Don) More	,,		
Inula cappa (Buch.-Ham. ex D. Don) DC.	,,		×
Myriactis nepalensis Less	,,		×
Siegesbeckia orientalis L.	,,		×
Lobelia pyramidalis Wall.	Campanulaceae		×
Campanula aristata Wall. ex Roxb.	,,		×
C. colorata Wall.	,,	×	×
Agapetes obovata (Wt.) Hk. f.	Vacciniaceae		
Vaccinium dumalianum Wt.	,,		
Cassiope fastigiata (Wall.) D. Don	Ericaceae	×	×
Lyonia ovalifolia Wall.	,,	–	×
Rhododendron arboreum Sm.	,,	×	×
R. barbatum Wall. ex G. Don	,,		
R. dalhousiae Hk. f.	,,		

Table contd.

Botanical name	Family	Mt. Nanda Devi	Mt. Kamet
Rhododendron. falconeri Hk. f. var *mecabena* Watt	Ericaceae		
R. griffithii Hk. f.	"		
R. hodgsoni Hk. f.	"		
R. inaequale Hutch.	"		
R. kendrickii Watt	"		
R. lepidotum Wall. ex G. Don	"	×	×
R. thomsonii Hk. f.	"		
Primula denticulata Sm.	Primulaceae	×	
P. listeri King ex Hk. f.	"	–	
P. scapigera Craib.	"		
Symplocos dryophylla Cl.	Symplocaceae		
Swertia tetragona Edgew.	Gentianaceae		×
Cynoglossum glochidiatum Wall. ex Benth.	Boraginaceae		×
Centranthera grandiflora Benth.	Scrophulariaceae		×
Hemiphragma heterophyllum Wall.	"		×
Pedicularis clarkeana Brace	"		
P. curvipes Hk. f.	"		
P. gracilis Wall. ex Benth.	"		×
Scrophularia elatior Benth.	"		
Goldfussia discolor Nees	Acanthaceae		
Craniotome furcata (Link.) Kuntz.	Lamiaceae	–	×
Elsholtzia flava (Benth.) Benth.	"		×
E. strobilifera (Benth.) Benth.	"		×
Plectranthus gerardianus Benth.	"		×
P. japonicus (Burm. f.) Koid.	"		×
Cyathula tomentosa (Roth) Miq.	Amaranthaceae		×
Chenopodium botrys L.	Chenopodiaceae	×	×
Fagopyrum dibotrys (D. Don) Hara	Polygonaceae	×	–
F. esculentum (L.) Moench.	"		×
Polygonum nepalensis (Meissn.) H. Gross	"	×	
P. rumicifolium Royle ex Beb.	"		×
P. viviparum L.	"	×	×
Rumex nepalensis Spr.	"	×	×
Daphne bholua Buch.-Ham. ex D. Don	Thymelaeaceae		
Sarcandra glabra (Thunb.) Nakai	Chloranthaceae		
Balanophora dioica R. Br.	Balanophoraceae		
Euphorbia pilosa L.	Euphorbiaceae		×

Table contd.

Botanical name	Family	Mt. Nanda Devi	Mt. Kamet
Bischofia javanica Bl.	Euphorbiaceae		–
Ulmus lanceaefolia Roxb. et Wall.	Ulamaceae		
Elatostema platyphylla Wedd.	Urticaceae		
Engelhardtia spicata Bl.	Juglandaceae		
Juglans regia L.	„	×	×
Alnus nepalensis D. Don	Betulaceae		×
Betula alnoides Buch.-Ham.	„		×
Castanopsis indica (Roxb.) DC.	Fagaceae		–
Quercus lamellosa Miq.	„		
Q. serrata Thunb.	„		
Pinus kesiya Royle ex Gordon	Pinaceae		
Tsuga brunoniana Carr.	„		
Cupressus torulosa D. Don	Cupressaceae		
Juniperus recurva Buch.-Ham.	„		
Cephalotaxus griffithii Hk. f.	Taxaceae		–
Taxus baccata L.	„	×	×
Anthogonium gracile Lindl.	Orchidaceae		
Arachnanthe clarkei (Reichb. f.) Rolfe	„		
Bulbophyllum piluliferum King et Pantl.	„		–
Calanthe brevicornu Lindl.	„	–	×
C. tricarinata Lindl.	„	×	
Ceratostylis himalaica Hk. f.	„		
Coelogyne fimbriata Lindl.	„		
Cymbidium macrorhizon Lindl.	„		–
C. tigrinum Par. et Reichb. f.	„		
Dendrobium chrysotoxum Lindl.	„		
D. denudans D. Don	„		
Eria confusa Hk. f.	„		
Goodyera fusca (Lindl.) Hk. f.	„		×
G. procera Hk.	„		
G. repens (L.) R. Br.	„	×	×
Habenaria pectinata D. Don	„		×
Hetaeria rubens (Lindl.) Benth.	„		
Liparis longipes Lindl.	„		
Ornithochilus fuscus Wall. ex Lindl.	„		
Pholidota imbricata Lindl.	„		
Pleione humilis (Sm.) D. Don	„		

Table contd.

Botanical name	Family	Mt. Nanda Devi	Mt. Kamet
Renanthera imschootiana Rolfe	Orchidaceae		
Satyrium nepalense D. Don	„		×
Vanda caerulea Griff.	„		
Zeuzine strateumatica (L.) Schltr.	„		×
Roscoea purpurea Sm.	Zingiberaceae		
Ophiopogon intermedia D. Don	Haemodoraceae		×
Dioscorea oppositifolia L.	Dioscoreaceae		
Asparagus filicinus Buch. -Ham ex D. Don	Liliaceae		×
Polygonatum cirrhifolium (Wall.) Royle	„	×	
Smilacina fusca Wall.	„		
Smilax menispermoidea DC.	Smilacaceae		×
Aneilema scaberrima (Bl.) Kunth.	Commelinaceae	–	×
Commelina paludosa Bl.	„		×
Cyanotis vaga (Lour.) Schult. f.	„		×
Juncus membranaceous Royle ex D. Don	Juncaceae	×	×
Arisaema tortuosum (Wall.) Schott var. *tortuosum* Hk. f.	Araceae		×
Carex baccans Nees	Cyperaceae		
C. cruciata Wahlenb.	„		×
C. filicina Nees	„		
C. nubigena D. Don	„	×	
Cyperus iria L.	„		
C. cuspidatus Kunth.	„	×	
C. sanguinolentus Nees	„		
Eleocharis congesta D. Don	„		
Scleria terrestris (L.) Fass.	„		
Andropogon munroi Cl.	Poaceae	×	
Arundinaria hirsuta Munro	„		
Arundinella nepalensis Trin.	„		×
Arundo donax L.	„		×
Arthraxon microphyllus (Trin.) Hochst.	„		
Brachiaria villosa (Lam.) A. Camus	„		×
Brachypodium pinnatum Beauv.	„		
B. sylvaticum (Huds.) Beauv.	„		×
Botriochloa pertusa (L.) A. Camus	„		×
Bromus asper Murray	„		
Calamagrostis emodensis Griseb.	„	×	×

Table contd.

Botanical name	Family	Mt. Nanda Devi	Mt. Kamet
Calamagrostis griffithiana Hk. f.	Poaceae		
Capillipedium parviflorum (R. Br.) Stapf.	"		×
Chmobambusa callosa (Munro) Nakai	"		
Danthonia jacquemontii Bor	"	×	
Deyeuxia pulchella (Griseb.) Hk. f.	"	×	×
D. scabrescens (Griseb.) Munro ex Duthie	"	×	–
Eragrostis nigra Nees ex Steud.	"		×
Eulalia quadrinervis (Hack.) Kuntz.	"		×
Helictrotrichon virescens (Nees ex Steud.) Henr.	"		×
Heteropogon contortus (L.) Beauv. ex Roem. et Schult.	"		×
Miscanthus nepalensis (Trin.) Hack.	"		×
Sporobolus piliferus (Trin.) Kunth.	"	–	×
Stipa roylei (Nees) Mez.	"	×	×
TOTAL NUMBER OF SPECIES (× = Presence) :		34	96

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